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Notes on the Herpetofauna of Mexico 30: A New Food Item for the Gray-banded Kingsnake, <i>Lampropeltis alterna</i> (A. E. Brown, 1901) Manuel Nevárez de los Reyes, David Lazcano, Joe Forks, Carlos A. Alejo Luna and Bryan Navarro-Velazquez	61
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Cover: Cottonmouths, *Agkistrodon piscivorus*, basking at a densite, LaRue–Pine Hills Ecological Area, Union County, Illinois, 24 March 2017. Photograph by John G. Palis.

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Notes on the Herpetofauna of Mexico 30:

A New Food Item for the Gray-banded Kingsnake, *Lampropeltis alterna* (A. E. Brown, 1901)

Manuel Nevárez de los Reyes¹, David Lazcano^{1*}, Joe Forks², Carlos A. Alejo Luna¹ and Bryan Navarro-Velazquez¹

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Abstract

A specimen of *Lampropeltis alterna* (Gray-banded Kingsnake / *Culebra Real Gris*) from the outskirts of the town of Bustamante, Nuevo León, Mexico, was collected and a fecal sample was analyzed. Various food contents were found in the stool, including a small portion of a feather from *Thryomanes bewickii* (Bewick's Wren / *Chirivín Cola Oscura*) and many scales belonging to *Sceloporus couchii* (Couch's Spiny Lizard / *Lagartija Espinosa de las Rocas*). This is the first time this lizard, endemic to Mexico, has been documented as a prey item for *L. alterna*.

Resumen

Después de analizar una muestra de heces de un ejemplar de *Lampropeltis alterna* (Gray-banded Kingsnake/Culebra Real Gris) colectado en las afueras de la cabecera municipal de Bustamante, Nuevo León. En la excreta encontramos restos de diversos alimentos, como una pequeña porción de una pluma de *Thryomanes bewickii* (Bewick's Wren / Chirivín Cola Oscura) y muchas escamas que resultaron ser de *Sceloporus couchii* (Couch's Spiny Lizard / Lagartija Espinosa de las Rocas). Esta es la primera vez que esta especie de lagartija endémica de México se documenta como una fuente de alimento para *L. alterna*.

Introduction

The observation reported herein arose as part of a research project being conducted to determine the herpetofaunal composition of Sierra de Gomas, which occupies the municipalities of Bustamante, Villaldama, Mina and Salinas Victoria in the state of Nuevo León, Mexico.

Background: *Lampropeltis alterna*

The gray-banded kingsnake, *Lampropeltis alterna*, occurs from southwestern Texas and extreme southeastern New Mexico southward through the Chihuahuan Desert of Coahuila to extreme northeastern Durango (Lemos-Espinal et al., 2015). In Nuevo León it has been found in the northern mountains of the state and in ranges alongside the Monterrey Metropolitan Area (Lazcano and Banda-Leal, in press).

Lampropeltis alterna is one of the most spectacularly colored and patterned of snakes (Lemos-Espinal et al., 2015). Lemos-Espinal et al. (2015) provides a good description of the species. The dorsal pattern is exceptionally variable. Usually it consists of 15 or more red or orange, black-bordered blotches on a pale to very dark gray ground color; the interspaces are about as long as or longer than the blotches themselves. The black borders are narrowly edged with white, even in very dark specimens. The size of the blotches varies greatly, from 20 scale lengths or more to 2–3; the smaller ones may even be broken into small, irregular streaks. The shorter the blotches, the more restricted the orange color, which is absent in the shortest blotches. The orange color may be so densely suffused with black that those blotches are scarcely distinguishable. The venter has irregular black markings. The head is gray, the same color as the inter-

spaces between blotches; a postocular dark stripe extending to the corner of the mouth is usually present, but markings on the dorsal surface are quite variable in size, shape and number. This is true throughout the range of the species, but especially in Texas.

Gray-banded kingsnakes feed primarily on lizards. They will also occasionally feed on small rodents, frogs, and the eggs of ground nesting birds, lizards and other snakes (Werler et al., 2000; Ernst and Ernst, 2003; Lazcano-Villareal et al., 2010; Lemos-Espinal et al., 2015). Various authors have documented the diet of these kingsnakes. For example: Murray (1939) reported observing an adult female in the Chisos Mountains attempting to swallow a *Sceloporus poinsettii* (as *Sceloporus torquatus poinsetti*). Mecham and Milstead (1949) found remains of *Sceloporus consobrinus* (as *S. undulatus consobrinus*)



A road-killed female *Lampropeltis alterna* from a canyon in Sierra Gomas Bustamante, Nuevo León. Photograph by Manuel Nevárez de los Reyes.

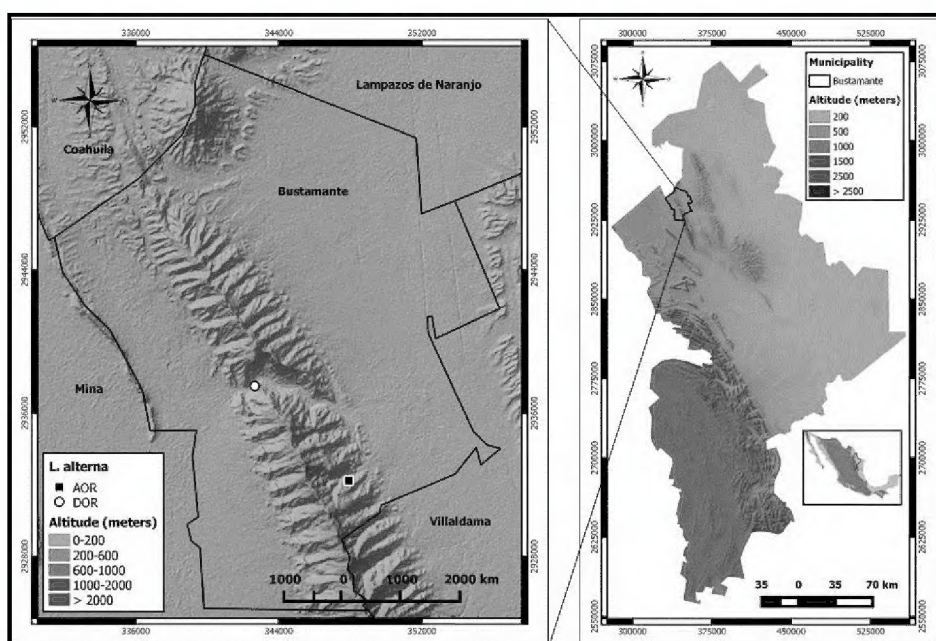
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A male *Lampropeltis alterna* crawling on the wall of a canyon in Sierra Gomas Bustamante, Nuevo León. Photograph by Manuel Nevárez de los Reyes.

in a DOR voucher specimen. Axtell (1951) documented that in captivity the snakes would eat mice, but when this prey was refused, they would resort to providing *Sceloporus merriami* and *S. olivaceus*, which they would readily take. Gehlbach and Baker (1962) reported *Plestiodon* sp. (as *Eumeces* sp.), *Sceloporus undulatus* and *S. poinsettii* (as *poinsetti*) as food items. Degenhardt et al. (1996) mention finding *Aspidoscelis scalaris septemvittata* (as *Cnemidophorus septemvittatus*) in the stomach of a road-killed specimen; they also cite a personal communication that an adult male in Brewster County had regurgitated an adult *Cophosaurus texanus*. Miller (1979) extensively documents the natural history of the species. Switak



Dots indicate the two specimens of *Lampropeltis alterna* collected (UANL-7662- DOR / UANL-7672-AOR) in Sierra Gomas, Bustamante, Nuevo León. Map by Javier Banda-Leal.

(1984) reports finding the remains of two snake eggs in a captured snake's feces. Tennant (1984) mentions that a captured specimen had regurgitated a canyon treefrog (*Hyla arenicolor*).

Gray-banded kingsnakes typically occupy limestone hills with agave communities, along with mesquite and creosote bushes. These kingsnakes are very active on limestone walls seeking refuge or prey. Their activity increases at the onset of the rainy season. They also shift their peak activity to more nocturnal hours as ambient temperature rises over the seasons. *Lampropeltis alterna* has been found between 450 and 2286 masl (Lemos-Espinal et al., 2015; Lazcano and Banda-Leal, in press).

Lampropeltis alterna is considered threatened in Mexico (SEMARNAT, 2010). The species has no protection status from the IUCN (IUCN, 2016).

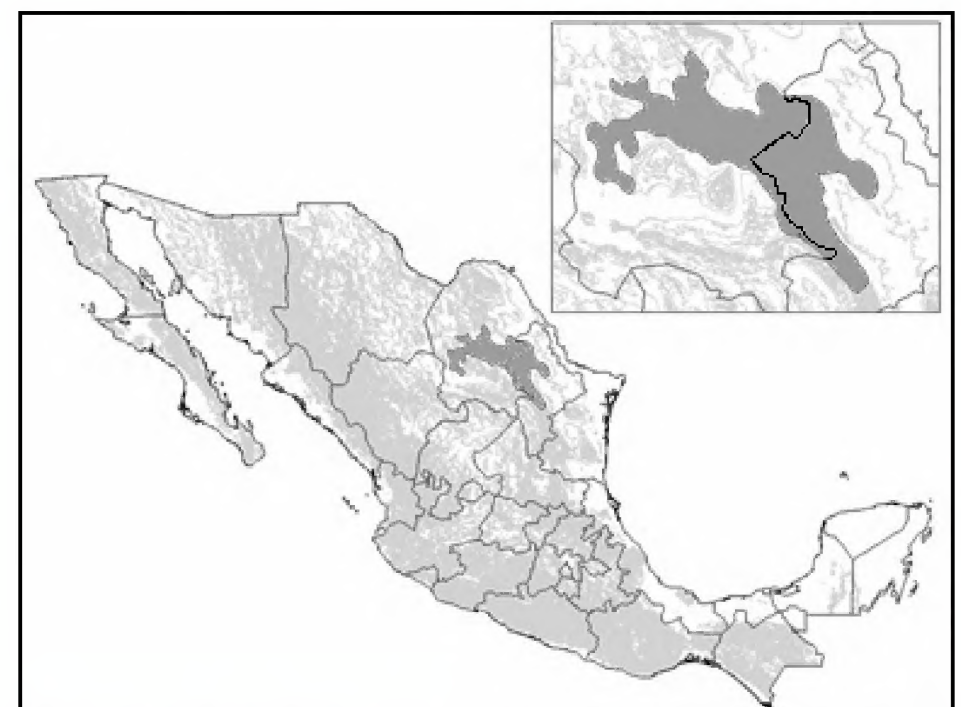
Background: *Sceloporus couchii*

Sceloporus couchii is a small, colorful species of *Sceloporus* endemic to northeastern Mexico. The species is distributed from the sierras of northern Coahuila southeastward to west-central Nuevo León (Lemos-Espinal et al., 2015). In Nuevo León it has been collected in the municipalities of Bustamante, Cerralvo, Higuera, Monterrey, Montemorelos, Sabinas Hidalgo, Santa Catarina, Santiago and Rayones. The species can undoubtedly be found within the adjoining municipalities toward the center and north of the state (Lazcano and Banda Leal, in press). It is found at altitudes between 450 and 2286 masl, in microhabitats very similar to those occupied by *L. alterna*.

Since a map of the entire distribution of *S. couchii* is lacking in the literature, we took on the task of developing a range map based on records from the literature, naturalists' observations, and vouchered specimens from the vertebrate collection of the Universidad Autónoma de Nuevo León and the personal database of observational records from one of the authors (MNR), resulting in the map below.

Lemos-Espinal et al. (2015) and Lazcano and Banda-Leal (in press) provide descriptions of the species:

Females are olive-gray above and on sides, with a series of seven or eight rounded dark spots which start off small on the neck but posteriorly get increasingly larger on either side of the



Distribution of *Sceloporus couchii* in the states of Coahuila and Nuevo León, Mexico. Map by Manuel Nevárez de los Reyes.



A male *Sceloporus couchii* from Sierra de Gomas, Bustamante, Nuevo León. Photograph by Manuel Nevárez de los Reyes.

vertebral region. A faint, slightly darker stripe extends from tympanum to the base of the tail. The ventral surfaces are tinged with blue, sometimes with faint, oblique, white stripes on the underside of the head.

During the breeding season males are quite colorful, with an overall pale blue tone. The dorsolateral series of dark spots, highly conspicuous in females is faint or scarcely evident on males; the dorsal area is gray-blue with small, scattered black flecks. A broad black band, sometimes mottled and irregular, extends from the axilla to groin and base of tail. This dark band is bordered above by a distinct, but not sharp, white stripe, also present ventrally, where it is not as evident. In front of the foreleg insertion is a bright vertical blue stripe that joins dorsolaterally with a pale stripe that interrupts the lateral black stripe. The blue stripe is preceded by the vertical black stripe, the upper part of which extends forward on the sides of the neck. A bright blue spot encircled by black flanks either side of the neck. The entire ventral surface is tinged with blue, darker on the flanks and the rear of the mid-throat. The underside of the head has numerous very dark blue streaks converging postero-medially into a light blue area, where the streaks are more dully colored. Around the periphery of the throat the pale interspaces are whitish. The lizard's extraordinarily complex coloration serves to enhance reproductive, foraging and defensive behaviors.

Habitat for *Sceloporus couchii* is associated with piedmont scrub, which is further divided into semi-thorn and rosetophilous desert scrubland, apparently without dominance of any particular plant species. The Spanish common name for the species, *Lagartija Espinosa de las Rocas* (spiny lizard of the rocks), was given precisely because it lives on mountain slopes with rocky limestone substrates. They are highly territorial and when threatened they lift and lower their body in response. Peak daily activity occurs in the morning and crepuscular hours. The altitude gradient for the species is from 400 to 2000 masl (Lemos-Espinal et al., 2015, Lazcano and Banda-Leal, in press).

This endemic lizard species has not been categorized by Mexican legislation as needing protection (SEMARNAT, 2010). Similarly, the IUCN lists it as LC (least concern) (IUCN, 2016).

Biogeography

The state of Nuevo León lies between 98°17' and 101°07'W,

and between 23°06' and 27°50'N. Neighboring states are Tamaulipas to the east, Texas on the northeastern border, Coahuila to the northwest and west, and Zacatecas and San Luis Potosí to the southwest. Shaped as an irregular rhombus exceeding 500 km at its longest (north/south) axis, its area is 64,081.94 km². Most of the state falls within the Northern Temperate Zone. However, a small portion extends south of the Tropic of Cancer (Cantú-Ayala et al., 2013).

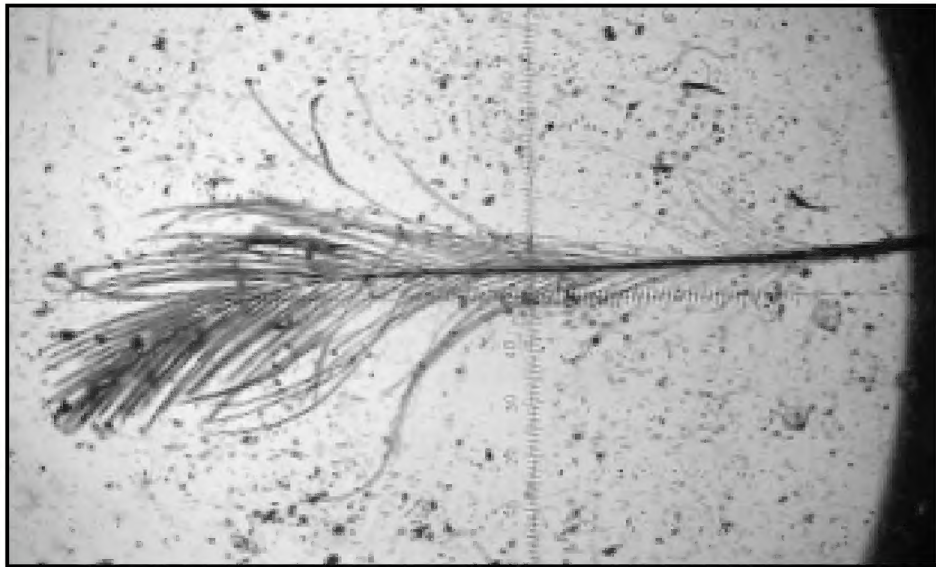
Nuevo León encompasses a transition zone between the Nearctic and Neotropical biogeographic divisions, giving the state a variety of ecosystems that have an enormous influence on the distributional patterns of vertebrate groups (Cantú-Ayala et al., 2013). Some of the following vegetation types are present: gypsophyllous plants, piedmont, rosetophilous scrub, chaparral, and oak and pine-oak forests (Cantú-Ayala et al., 2013). These vegetation assemblages play an extremely important role in species distribution.. To analyze the distribution of the species involved in this account, throughout the state of Nuevo León, we used the classification system of physiographic regions (= subprovinces) developed by INEGI (1986). The species reported herein, are inhabitants of the Sierra Madre Oriental in Nuevo León and Coahuila, in the subprovinces Gran Sierra Plegada, Pliegues Saltillo-Parras, Sierras y Llanuras Coahuilenses and Sierra de la Paila (Nevárez-de los Reyes et al., 2016).

Results

We document herein the previously unreported predation on *Sceloporus couchii* by *Lampropeltis alterna* (UANL-7672, male). The snake was found 2 July 2016 at 2202 hrs in a roadcut 7 km on the road to Grutas de Bustamante in the municipality of the same name (Latitude 26.502450°N, Longitude 100.526222°W, datum WGS 84, elevation 840 masl). It was active on a rock wall within a piedmont vegetation community. The area is a portion of Sierra de Gomas in this municipality. This was also the first live *Lampropeltis alterna* found by our research group. The *L. alterna* measured snout-vent length = 595 mm, tail length = 115 mm, total length = 610 mm, mass = 50.9 g. The prey was determined by analyzing a fecal sample that was obtained when the animal arrived at our laboratory. We found



Lampropeltis alterna fecal sample (70×) showing *Sceloporus couchii* scales. Photomicrograph by Carlos Solís-Rojas.



Lampropeltis alterna fecal sample (70×) showing a tiny section of a *Thryomanes bewickii* feather. Photomicrograph by Carlos Solís-Rojas.

many scales in the fecal matter, which were identified as those belonging to *Sceloporus couchii*. We also found in the feces a small section of a feather from *Thryomanes bewickii* (Bewick's Wren / *Chivirín Cola Oscura*), and many insect fragments that were likely from the lizard's stomach contents.

The first *Lampropeltis alterna* found by our group (UANL-7662, female) was a salvaged specimen found on the road in Bustamante Canyon (UTM 342 647 2937 520, (Latitude 26.549595°N, Longitude 100.579611°W, datum WGS 84, elevation 521 masl). Its measurements were snout-vent length = 326 mm, tail length = 67 mm, total length = 393 mm, mass = 16.8 g.

Our presence here was part of an ongoing survey on the herpetofauna of the sierra. These canyon areas have yielded interesting records, resulting in the addition of 10 previously unreported species for this region. The new species records include: *Bogertophis subocularis*, *Coluber schottii*, *Leptodeira septentrionalis*, *Pantherophis emoryi* and *Micrurus tener*. Unfortunately, these were all salvaged road-kills. *Hypsiglena jani*, *Nerodia rhombifer*, *N. erythrogaster* and *Thamnophis proximus* were observed live.

Conclusion and Discussion

The gray-banded kingsnake is one of the best documented snakes of the south-central United States. This interesting desert dweller has been present in the pet trade for decades, where herpetoculturists have been able to work with their many morphs. The same cannot be said about its presence in Mexico, since the pet trade in Mexico has grown only slightly with the years, due to the exorbitant market price of pet reptiles in the country.

The herpetological collection of the Autonomous University of Nuevo León contains a total of seven preserved specimens (UANL-0459, 5018, 6986, 7405, 7485, 7486 and 7662) all collected from municipalities close to the Monterrey Metropolitan Area. The stomach contents of the preserved specimens have not been examined. Even though the populations from the U.S. have undergone extensive life history studies, data regarding Mexican populations is lacking. More collecting or surveying in the northern part of Nuevo León is needed to find other populations of *L. alterna*, especially in sierras such as Cerro de La Popa, Fraile-San Miguel, Milpillas, Minas Viejas, Lampazos, Papagayos, Sierra del Medio, Sierra del Arco, Cerro Boludo and Pico Candela, and throughout all the valleys in between. A reasonable effort within all the aforementioned sierras is likely to find other populations of *L. alterna*. These may in turn lead to more life history studies for Mexican populations of *L. alterna*, providing more information regarding their diet.

Acknowledgments

To all our teammates in the field and laboratory for working meticulously and enthusiastically. To the San Antonio and Los Angeles Zoos, Bioclon Laboratories S.A. de C.V., Universidad Autónoma de Nuevo León its research programs PAICYT [Programa de Apoyo a la Investigación Científica y Tecnológica (CN361-15)] , and scholarship obtained by one of the authors from CONACYT MNL = Convención 445411) for financing part of this project. SEMARNAT for providing collecting permits OFICIO NUM.SGPA/DGVS/05579/15/25 de Mayo 2015 and OFICIO NUM.SGPA/DGVS/008371/16/11 de Agosto 2016.

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Reproduction in Beccari's Keeled Skinks, *Tropidophorus beccarii* (Squamata: Scincidae), from Borneo

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Abstract

A histological examination of gonadal material from 33 *Tropidurus beccarii* from Borneo was carried out. All examined males exhibited spermiogenesis except for one May male with a regressed testis and one March male in late recrudescence (spermatids predominated). The smallest mature male *T. beccarii* (spermiogenesis) measured 63 mm SVL; the smallest mature female (early yolk deposition) measured 66 mm SVL. Mean litter size (N = 4) was 5.3 ± 1.7 SD, range = 3–7. Seven is a new maximum litter size for *T. beccarii*. The presence of 6/13 (46%) reproductively inactive females might suggest some seasonality in the *T. beccarii* ovarian cycle.

Tropidophorus beccarii is endemic to Borneo where it inhabits rocky streams in dipterocarp forests and feeds on water insects (Das, 2004). It is “ovoviviparous, and gives birth to four live young” (Das, 2004). It is a large semi-aquatic species of *Tropidophorus* reaching 95–98 mm SVL (Malkmus et al., 2002). In this note I provide additional information on *T. beccarii* reproduction from a histological examination of museum specimens. Utilization of museum specimens for obtaining reproductive data avoids removing additional animals from the wild.

I examined 33 *T. beccarii* from Borneo deposited in the herpetology collection of the Field Museum of Natural History (FMNH), Chicago, Illinois, USA, consisting of 14 adult males (mean SVL = 81.4 mm $\pm$ 13.3 SD, range = 63–103 mm), 13 adult females (mean SVL = 81.0 mm $\pm$ 8.4 SD, range = 66–94

mm), one immature male (SVL = 55 mm) and 5 unsexed juveniles (mean SVL = 41.6 mm $\pm$ 4.0 SD, range = 36–46 mm). The specimens were collected between 1963 and 2007. An unpaired *t*-test was used to compare male versus female mean SVL using Instat vers. 3.0b (Graphpad Software, San Diego, CA, U.S.A.). The two-tailed *P* value of 0.922 was not significant (*t* = 0.099, *df* = 25).

The left testis was removed from males and the left ovary was removed from females. Enlarged follicles (> 4 mm) or oviductal eggs were counted (in situ). No embryos were found. Tissues were embedded in paraffin and cut into sections of 5 μ m. Slides were stained with Harris hematoxylin followed by eosin counterstain (Presnell and Schreibman, 1997). Slides of testes were examined to determine the stage of the spermato-

Table 1. Monthly changes in the ovarian cycle of 13 adult females of *Tropidophorus beccarii* from Borneo; * embryos were not present

Month	N	Quiescent	Early yolk deposition	Enlarged follicles > 4 mm	Oviductal Eggs*
January	1	1	0	0	0
February	1	1	0	0	0
April	2	0	0	1	1
May	1	0	1	0	0
June	2	2	0	0	0
July	2	0	1	1	0
August	1	1	0	0	0
September	1	1	0	0	0
October	1	0	1	0	0
November	1	0	0	1	0

genic cycle. Slides of ovaries were examined for the presence of yolk deposition. Histology slides were deposited in FMNH. The Appendix lists the examined specimens of *T. beccarii* from Borneo by state and district.

Three stages were present in the testicular cycle: (1) regression, germinal epithelium is reduced to 2 or 3 layers of spermatogonia and interspersed Sertoli cells; (2) recrudescence, there is a proliferation of germ cells for the upcoming period of sperm formation; (3) spermiogenesis, seminiferous tubules are lined by sperm or clusters of metamorphosing spermatids. With the exception of one May male with a regressed testis (SVL = 71 mm, FMNH 239700) and one March male (SVL = 78 mm, FMNH 239701) in late recrudescence (spermatids predominate),

all males exhibited spermiogenesis: April (N = 1), June (N = 2), July (N = 2), August (N = 2), September (N = 1), October (N = 1), November (N = 1), December (N = 2). Whether the single May male with a regressed testis or single March male in late recrudescence indicates some seasonality in the *T. beccarii* testicular cycle is not discernible. Examination of additional males is required to answer this question. The smallest mature male (spermiogenesis) measured 63 mm SVL (FMNH 243841) and was from August. One smaller male (SVL = 55 mm, FMNH 240165) contained a regressed testis and was considered a subadult.

Four stages were present in the monthly ovarian cycle (Table 1); (1) quiescent, no yolk deposition; (2) early yolk deposition, basophilic yolk granules in the ooplasm; (3) enlarged follicles > 4 mm; (4) oviductal eggs. Mean litter size (N = 4) was 5.3 ± 1.7 SD, range = 3–7. Seven (FMNH 188596) is a new maximum litter size for *T. beccarii*. The smallest reproductively active female (early yolk deposition) measured 66 mm SVL (FMNH 158788) and was from May. There was no indication that females produce multiple litters as no female with oviductal eggs/embryos and concurrent yolk deposition was found. This may reflect my small sample size. Five smaller *T. beccarii* (mean SVL = $41.6 \text{ mm} \pm 4.0$ SD, range = 36–46 mm) were not sexed and were considered as subadults. The presence of 6/13 (46%) reproductively inactive females might suggest some seasonality in the *T. beccarii* ovarian cycle although my female sample is too small to answer this question. However, of interest, is that Goldberg (2010) similarly recorded 10/23 (43%) of adult females with quiescent ovaries in the congener *T. brookei* from Borneo.

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I thank Alan Resetar (FMNH) for permission to examine *T. beccarii*.

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Appendix

Tropidurus beccarii from Borneo, listed by state and district, from the herpetology collection of the Field Museum of Natural History (FMNH), Chicago, Illinois, U.S.A. **Sarawak State**, Belaga District: FMNH: 221479; Bintulu District: FMNH 158788, 158811, 158812, 158814, 158786, 269805; Kapit District: FMNH 145665, 188596; Tambunan District: FMNH 239671, 239701; **Sabah State**, Lahad Datu District: FMNH 240615; Ranau District: FMNH 239700, 249002, 248998, 248999, 249005, 251057; Sandakan District: FMNH 217438; Sipitang District: FMNH 235161, 235188, 235189, 239715, 243840–243842; Tenom District: 239707, 239711, 239762, 239705, 239706, 239712, 243846.

Wooster's Run

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A couple of years ago, I was sitting fat, dumb and happy at work, when an email crossed my line of vision. It was from a Facebook-loving friend who had just picked off a diatribe that spent no small amount of verbosity directed against this guy Roger Repp. My anthill-stirring buddy of course felt the need to share this particular rant with me. It was quite the one-sided discussion, as is often the case when some pompous ass in a bad humor suddenly addresses the world from the safety of a comfortable chair. The person who was on the attack was the same person who taught me the fundamentals of hands-off herping, more than 25 years ago. I apparently fell from his good graces when I started a radio-telemetry project back in 2001. In his estimation, I crossed the line, and became “one of those know-it-all researchers.” Damn them!

The rant began in a semi-kind fashion. At least this here Roger Repp was out there grinding—unlike so many others of the ilk that he hangs out with. (Those damn, know-nothing researchers). He went on to say that by sticking transmitters in five species of venomous reptiles, I can't really be learning anything. After all, everything is just running away from me. Yeah, right! That's all they were doing—running away from me. Goodness gracious! To be sure, the surgeries, blood drawing, microchips and other such things required to *prove* science can be detrimental to the health and well being of *any* wild animal. But if they were running from me, they were running from one known site to another, and almost always went back to the same winter dens. In other words, in *most* cases, they were doing what, in my estimation, they normally do. And without transmitters, *nobody* knows exactly what they are doing. Period.

For somebody to attack this author on such a medium is pretty gutless. It is fighting a battle of wits with an unarmed man. I refuse to play! I refuse to sign up for Facebook. I am fighting tooth and nail to never create another gol-durned password again. So now, I'm going to join just so I can rise up in righteous and verbose indignity against this person? He's picking on some poor slob who is doing his best to understand a difficult world by simply telling the truth. Your author is a low, festering sore of honesty amongst mountains of conjecture, speculation, and outright BS. It's difficult to compete in a world where the first liar doesn't stand a chance. But on the other hand, this rant got me all sorts of riled up. I actually started to make the plunge into Facebook, password and all, just to properly refute this here “running from me” stuff. But this would have been a rash act, and I quickly talked myself out of it. It would have set up hours of prolific email flandickery, merely to agitate a bag of wind. But the more I thought about what the bag of wind was blowing in with, and this “running away from me” business, the more the idea intrigued me. Deep feats of thinking next transpired about all the herps that we surgically implanted with transmitters. Out of perhaps 100 herps with transmitters, one *might* have been running away from us. Maybe Wooster? Yeah—I do believe that Wooster *was* running from us. A series of circum-

stances set up poor Wooster the Tiger Rattlesnake (*Crotalus tigris*), AKA Ct20, for a serious screwing by science.

Ct20, “Wooster,” was originally found by Wolfgang Wüster during one of his September sorties when he brings a group of his students from the UK to Arizona. A small detail that is best placed here is that where Wüster found Wooster was as far west as they get on our plot. While we normally name our subjects after those who find them, “Wolfgang the tiger” just didn't cut it. Sorry, Doc! We decided instead to name his find “Wooster the tiger.” It does have a nice ring to it, doesn't it? And we had fun with phonics in the spelling of Ct20's name in order to avoid the complicated, pain-in-the-ass process of adding that sideways colon above the u every time we typed his name. Umlauts—peh! Everybody *here* knows that a colon is meant to be vertical. Today, we work on the colons. Tomorrow, we will delve into Ws that sound like Vs, and Vs that sound like Ws. You guys talk funny over there!

Wooster's date of capture was 5 September 2013. There must have been 30 people out there that night. Yegads, you should see the way these Europeans blunder through cactus! It actually would have benefitted them *all* to have sideways colons—seeing how the lot of them were crotch deep in prickly pear most of the time! There can be no doubt that several of them went to bed with dingleberries of the harshest variety that night. But they are, after all, descendants of the Vikings, and impervious to such trivialities. Wiping all talk of colons aside, we move on in the narrative.

Following Wooster's capture was a surgery to implant a transmitter, followed by a release at the point of capture. Wooster set up the beginnings of a nice home range for us that fall. He chose to hang out in Suizo Wash, and the north side of Iron Mine Hill—the study's epicenter. On 12 October, he saw fit to bury himself in a known *atrox* aggregate den that carries the name Atrox Den #8, or AD8. We had found AD8 several years previous, and were delighted that Wooster had selected such a *fine* place to overwinter—in with his buddies, the *atrox*! Wooster eventually egressed in late April 2014, and stayed right in that same groove as the previous fall. He was a *dandy* of a tiger, 765 mm (~30 inches) in total length, with a hefty mass (for a tiger) of 391 grams (0.857 lbs), and a rattle count of basal plus 9 segments, the 10th being broken (Figure 1). He maintained his health and mass throughout the spring and summer. The fact that he stayed so close to the home ranges of the people tracking him worked against him. That, and the fact that he overwintered among a favored *atrox* roost of ours made keeping him in the game a no-brainer kind of decision.

Hence, he was recaptured on 9 September 2014 to receive a new transmitter. One of the *many* problems with transmitters is that the small size required for tigers, 9 grams to be exact, imposes a battery life of one year (in a good year). Wolfgang captured Wooster on 5 September, right in the thick of the sole



Figure 1. Male *Crotalus tigris* # 20, (Ct20) “Wooster,” as photographed on the evening of his capture, 5 September 2013. Image by the author.

mating season that tigers possess. Despite claims to the contrary, no spring mating scenario has ever been properly documented with the species. Early September is the bull’s-eye for finding tigers paired or in copula. We had to be quick to get him back into the game for his sake, as well as ours. We *lived* to see tigers paired or mating. We did the surgery on 10 September, and prepared to get him back to his capture spot on 12 September.

Hence, the evening of 12 September 2014 found me standing in the deep sand of Suizo Wash, right in front of the thick patch of ragweed that I snagged Wooster from 3 nights previous. Wooster was still in the bag, ready to be released when I did the one thing that must *always* be done at this point. I checked his signal one last time. Instead of crisp, clear blips coming through the receiver, I heard a whiny siren. It was one long, steady wail that did not stop or waver. It did not increase or decrease in volume—whether I put the antenna to the bag, or stepped back several paces. In short, even though the transmitter was checked both pre- and post-surgery, it was now defective. *It went bad in two days flat!* There then arose another wailing noise in the quiet depths of Suizo Wash. This one was a boisterous run-on sentence of every cuss word in the English language, directed mainly at the manufacturer of the transmitters we used. Three hundred and sixty bucks I paid out of pocket for this electronic, whiny-ass dud! Also involved was a long drive to Tempe for the surgery, the painstaking details of a full-up processing, the return trip home, and finally, the effort to get the snake back in the game. It was all one long, expensive and painful screwing. But as bad as it was for me, it was Wooster who bore the brunt of the blow that followed.

I had five choices: kill Wooster; keep him as a pet; release him with the bad transmitter; take him back up to Tempe to have this transmitter removed, and release him without one; *or* take him up to Tempe and stick another transmitter in him. We wanted Wooster in our study. He was a fine prime of life male with a very favorable home range. On top of that, he had responded well to his first two surgeries—not always the case with rattlesnakes of any species. His choice of overwintering sites was ideal. And so, the fifth solution to the problem in hand—stick in a new transmitter, was my favored option. But every solution creates new problems. In this case, said problem was that I was fresh out of

transmitters. The last one that I had went into Wooster.

Wooster made the ride back home with me that night, and I made the phone call to the makers of the transmitter the following morning. When I got their sales rep on the phone, I had him listen to the sickening sound emanating from their electronic whiny-ass dud, and he was of course outwardly the bastion of concern and sympathy over the defect. He agreed to build a new transmitter on a rush order basis, free of charge, and ship it my way. I would keep Wooster until such time as the new transmitter arrived, and get him back into the study as soon as was possible after that.

I did not consult with Wooster about this decision. Perhaps if I had done so, the three weeks that he spent in captivity waiting for this “rush order” to materialize might have gone better for him. Here we had a randy rattlesnake, supercharged with testosterone over 100 times greater than the average male Olympic athlete. On top of that, he had no hands to deal with a set of raging hemipenes, and was completely shut out of the one chance that he had to mate in 2014. He was *not* a happy camper! That first night, I lodged him in a 20-gallon aquarium, the bottom lined with newspaper, with a hide box more than ample in size for him to remain comfortably out of sight for his ordeal.

Tiger Rattlesnakes are known for having a sweet and mellow disposition. Even when thoroughly provoked, they seldom rattle, and are even less inclined to strike. While I would never seriously consider doing such a thing, I am convinced that I could easily bare-hand and free-handle most of the individuals on our plot, and get away with it unscathed. (Rattlesnake whispering can be done, but the penalty is too severe for this wuss to honestly consider.) But there were no rattlesnake whispers going down here. Wooster made it very clear to me that he wanted a piece of me. There was a free venom donation to be willingly delivered if I gave him the chance. The morning after I put him in the aquarium after *almost* freeing him, I quietly entered the room. He suddenly upended his hide box, and broke into a furious state of rattling upon my entrance to the room. Wham! Wham! Wham! He struck at the glass thrice, and six dual streamers of viscous venom began flowing down the side of the aquarium that he attacked. There would have been a fourth wham, but the keeper reacted in time to stop it from happening. I had left Wooster’s snake bag in the five-gallon bucket the night before, stretched over the perimeter of the top, primed and ready to load if needed. (This was nowhere near my first rodeo with rattlesnakes at this point in my avocational herpetological career). I tore the screen top off the lid of the aquarium, snagged the highly agitated snake with my Whitney tongs (the best), and dropped him into the sack. The bag was deftly knotted and laid to one side before Wooster knew what hit him. But still, the sack writhed and leapt into the air as this supercharged, testosterone-afflicted *jerk* of a snake went berserk inside. I worked hard that morning to sterilize a big, opaque polyurethane plastic storage box for him, lined the bottom with fresh newspaper, stuck in his hidebox and a water bowl, unknotted the bag and carefully slipped him into his new home. He tried to bull-rush his way out of the top, (over 60 cm tall), several times before I could successfully get him back in for good. Jeez Louise! What a pistol Wooster was! I next covered the whole setup with a dark bed-

sheet, and stuck the whole hefty affair into a remote corner of the least often used room in our house. For the next three weeks, if I even so much as approached the door to this room, vigorous rattling accompanied by loud thumps occurred. At least he was face-planting himself against soft plastic, instead of glass. Each time this happened was a knife blade in my heart. While it technically was *not* my fault, I have gone through life believing that “the buck stops here.” I was in control of a situation that was now out of control. The manufacturers of the transmitter ineptly wailing away inside of Wooster can easily be blamed, but what I did to Wooster was wrong. I was depriving him of freedom when he wanted it most. And his reaction indicated that he too had a plan for dealing with it. When I *finally* put him back on his capture spot on the evening of 5 October 2014, he put *his* plan into motion. The key word being “motion.”

Run Wooster, run! See Wooster run! It’s like something out of a Dick and Jane reading primer. Run! Run! Run! See Wooster try to deal with the hell that always seems to be hot on his tail — wherever he goes. Hell is always behind him, and hell always seems to find him. They have hurt him twice recently. They have kept him in places that he doesn’t like. They dominated him

when he did not wish to be dominated, and now all that he wants to do is to be rid of them— forever! He hates them. Hate Wooster, hate! Hate! Hate! Hate! So he keeps moving. He blasts right past AD8, his former overwintering site, and keeps heading east. Running from this cold terror is all that he knows how to do. Keep running, and *surely* he will lose them? But no! They keep coming, and in his determination the only thing to do is to keep running. In two weeks time, he slithers over 1200 meters east of AD8, well out into a tigerless bajada that he has no real business occupying. And still those bastards are hot on his tail. He then turns northward, and heads into the hills. But everywhere he goes, they always find him. Long after his kind have settled in for the winter, he is *still* on the run. He goes up — and keeps going up, until there is but one suitable rock structure to overwinter in. The top of the mountain is just beyond this structure. He is tired, the nights are cold, and there is really nowhere else to run. And the bastards have found him again! He makes one more minor shift, and rests for over four months.

The bulk of Wooster’s Run transpired from 5 October to 8 November. Over the course of that 34-day period, going point-to-point in straight-line distances, he traveled an astounding

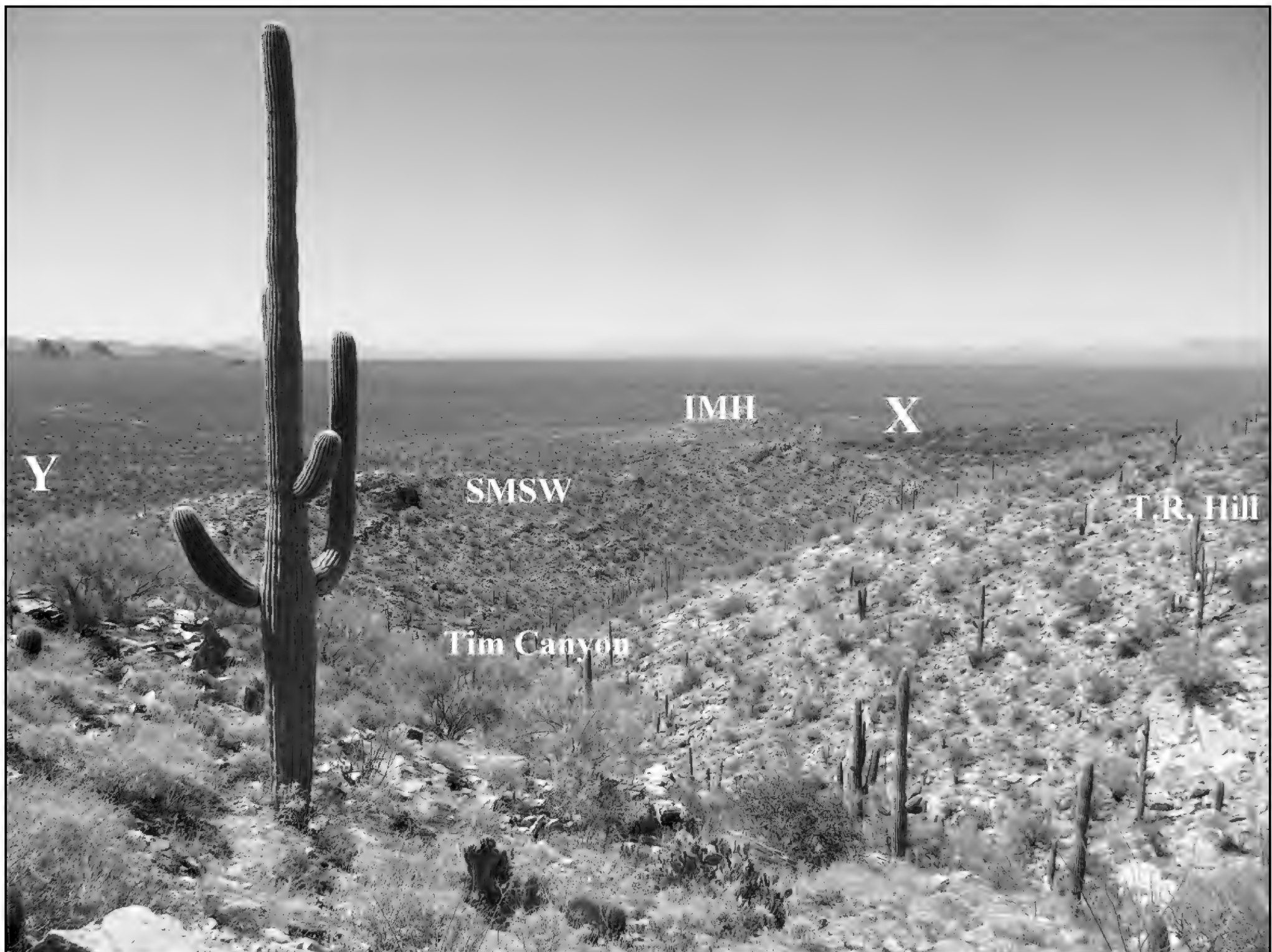


Figure 2. Wooster’s Run. The X marks the spot of his initial capture on 5 September 2013. The Y marks the 18 October 2014 location where he swung north and headed into the hills in order to avoid those pursuing him (in the author’s opinion). The place that he overwintered is directly behind the photographer. IMH is for Iron Mine Hill—the center of the Suizo Mountain Study. AD8 is directly below the bottom of the “I” of the “IMH.” For scale, Iron Mine Hill is roughly 500 meters across. SMSW is for Suizo Mountain Southwest—a long ridge that rises abruptly above the north edge of Suizo Wash. Tim Canyon was our route up when we tracked Wooster. As shown in the image, Tim Canyon runs east to west between SMSW and T.R. Hill. Keep in mind that Wooster’s Run was actually Wooster’s Crawl. He did all this on his belly! See text for further details. Image by the author.

2133 meters! That is an average of 63 meters per day! This was during that time period when the four other tigers under our watch were either already close to their overwintering sites, or already in and down for the count. The most impressive part of his run occurred after 18 October, when he turned north, put his back to AD8, jetted across Suizo Wash, and headed up into the Suizo Mountains proper. He gained 105 meters in elevation in 20 days time, moving steadily uphill a straight line distance of 1173 meters—or 59 meters per day—through rugged terrain. There were four of us doing the tracking throughout this time period—and it took *all* of us to stay with him. A less-than-one-pound snake dragged over 800 pounds of flesh on the hoof behind him during his run. At the end of each tracking session, whoever tracked him would return wide-eyed and exhausted. The last time that I personally tracked him while he was on high was 18 April, 2015. On that day, he had reached the greatest elevation we were ever able to document for him. The most advantageous parking spot to start the tracking session is at 800 meters elevation. He was 139 meters, or 456 feet, above my truck. I took a photo from his highest location, taking care to try to capture his entire home range with that image (Figure 2).

The final tracking of him while he was on high occurred on 10 May. After that, he had us beat. Had he remained on high, we likely never would have seen him again. There were three tracking sessions where every other animal on our docket was tracked down *except* Wooster. With each of these three sessions, we noted he was still way the hell up there, and waved him off. But on 13 June, I was pleasantly surprised to note that his signal was coming through loud and clear from Suizo Wash, roughly 50 meters north of the center of Iron Mine Hill. At some point between 10 May and this day, he had bombed back down to the center of his fall 2013 and spring/summer 2014 home range. He had traveled 1348 meters (4242 feet), and dropped 129 meters (423 feet) in elevation to get there. From that point on, he settled back into his old haunts, and by 14 November, entered AD8.

Wooster's Run was officially over on that 13 June 2015 date. From that point on, while he still knew that we were tracking him, he evidently accepted that notion, and settled down. The last good full-body image of him that I took occurred on 25 September 2015. (Figure 3). He was in good health at that point in time, and remained so until he entered AD8. By then, there were only three rattlesnakes with transmitters blipping away in our study. All three were Tiger Rattlesnakes, and with all three



Figure 3. The author's last full-body look at Wooster. He is coiled in a classic ambush posture, seemingly unperturbed by the tracker/photographer. Image by author, 25 September 2015.

of them, their transmitters winked out by January of 2016.

How that all happened can be explained in a future column. For this one, it's time for the wrap-up. In retrospect, I am glad that the Facebook post came my way. The words made me think about something that I had already almost forgotten. While there can indeed be problems (with a capital P) with radio-telemetry, it is still the *only* way to be sure with scientific certainty of what any given animal can be doing on any given day throughout the course of any given year. Can the reader even imagine trying to stay with an animal like Wooster without it? Impossible!

Now that my radio-tracking days are behind me, I've returned to my old ways. I have made peace with the rattlesnakes, Gila Monsters, and tortoises under my watch. From November to mid-March of every year, I see some of the same individuals return to their overwintering sites. I am doing my best to use a camera and notes to replace the PIT tags and transmitters. I am having limited success with knowing some of them for five months out of each year. Two of these are relics from my tracking years with tigers—two of the last three snakes we ever tracked. We have yet to get a visual on Wooster at AD8, but that does not mean he isn't there (Figure 4). Once they leave their shelters, as they have just done at the point of this writing, I can only wait until next November to have another shot at them. I'll keep trying for Wooster, but this time, the odds are in his favor. He may have *finally* lost us forever. Time will tell.

This here is Roger Repp, signing off from Southern Arizona, where the turtles are strong, the snakes are handsome, and the lizards are all above average.

Acknowledgments

To Dr. Gordon Schuett, who initiated the Suizo Mountain Study, and hung with us in spirit even when he could physically no longer be at our side. To that guy in Tempe, Dr. Dale DeNardo, who skillfully, willingly and cheerfully did *all* of our surgeries for us, and often came along for the fun that follows. A big tip of the hat also to John Slone, Marty Feldner and Kent Jacobs—who helped me to stay with Wooster throughout the thick of his run and beyond. We would also be extremely remiss if we did not thank the herps of the Suizo Mountain Study—who willingly or otherwise, paid the ultimate price for a better understanding of the battle that is waged on the ground beneath them. They were good teachers to some very riveted students.



Figure 4. Some AD8 action. Wooster could easily be in the crevice behind the *atrox* at the date of this writing. He has wintered here before, and we hope to see him again here in the future. Image by the author.

What You Missed at the March Meeting

John Archer
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Ever since I've been a member of your society many of you have suggested that I could use a bit more education in several areas. Areas like writing, managing, speaking, driving, breathing, and herpetology. Of course they're correct, but one only has so many minutes to the day and I need those minutes to think up ways to avoid work. Few people appreciate how difficult a task that is. So I've consistently resisted formal courses of training and relied on listening to our speakers as the easiest way to increase my knowledge of the field of herpetology.

But some of the course offerings are tempting. A couple of our members have suggested a course in tropical herpetology staged in Costa Rica. I like the idea of lounging in a hammock in a tropical paradise while occasionally glancing over at an eyelash viper (*Bothriechis schlegelii*) that has been sitting on the same eye-level branch for a week while I've been sipping banana daiquiris and he's been waiting for that careless lizard. But it turned out that it was a real college course with academics and stuff that might actually make me think. Well, I couldn't subject myself to that. So I declined.

Then I met our March speaker. Who happens to be the guy who teaches that course in Costa Rica. While he is certainly an academic, he does not fit the image that I had created in my mind of a stern and demanding lecturer who would have me running transects, crawling through forest debris, and measuring to the millimeter the height of that viper above the ground. He might have a student do all of that, but I know he'd make it interesting because he made his talk interesting. His talk was titled "Demography and Life History of an Imperiled North American Rattlesnake (*Sistrurus catenatus*)."

So I'll steal the introduction from our website:

Eric T. Hileman is a postdoctoral fellow in the biology department at Trent University in Peterborough, Ontario, Canada. He earned his Ph.D. from Northern Illinois University and holds B.S. and M.S. degrees from the University of Wisconsin-Parkside and the University of Wisconsin-Milwaukee, respectively. He is interested in traditional and spatially explicit capture-recapture models, population ecology, life-history evolution, and conservation biology. Eric is the former Director of Conservation, Education, and Animal Welfare at the Racine Zoo in Racine, Wisconsin. He has taught field-based tropical herpetology courses in Costa Rica for the last decade.

And he's a nice guy. Perhaps because he's a herpetologist? I know there are herpetologists who aren't nice—there have to be—but I think they're hard to find.



Eric T. Hileman. Photograph by Dick Buchholz.

Demography is the statistical study of populations, and mark/recapture is one way to acquire the data needed for such studies. Eric wanted to lead us through how demographics can give us insights into the population ecology and life history of massasaugas. While the snakes have been studied extensively, there still remains much we don't know. We have a pretty solid grasp of their spatial ecology or how they move, and their habitat use. Massasauga is a corruption of a Native American word for "great river mouth" and these animals thrive in wetlands. As usual, there is much we don't know about them. We don't know their abundance, survival rates, reproductive capacities, or emigration/immigration movements. Demographics can shed light on these.

Prior to last year when they were federally listed, massasaugas were protected in every state and province where they occur save for Michigan, but that protection was a long time coming. Wisconsin actually had a bounty on the animals until 1975. As for too many species, habitat loss and harvesting has caused populations of the little rattler to decrease, and conservationists need to have information that will allow them to develop recovery plans that will actually work. The snakes range throughout the Great Lakes area and previous demographic studies have been done for three populations, all on the perimeter of the range. The problem with using results of border populations is that demographic data is very site specific and surrogate data can often lead to wrong conclusions.

Dr. Hileman worked with 22 zoos and the Edward Lowe Foundation to conduct research in support of the Eastern Massasauga Rattlesnake Species Survival Plan (EMR SSP) attempting to promote the snakes' conservation in the wild. He praised the Edward Lowe Foundation for their commitment to land stewardship and specific programs benefitting these little venomous creatures. A Michigan site was chosen for its habitat, relatively large population of snakes, and importantly, its location nearly dead center in the snakes' range. Mark/recapture studies are expensive and labor intensive. Snakes, especially small cryptic snakes, are difficult to find in the wild. Eric used various types of cover, different kinds of traps, and visual surveys to gain as clear a picture of the animals in that population as possible. All of that means it is not practical to survey every population of massasaugas, but this population because of its central location would help bridge the gap left by those earlier studies of outlier populations.

Burning is an important habitat management tool for many species, but particularly for massasaugas that need open wet-

lands. Ongoing studies have determined best times to burn based on soil temperature rather than relying on calendar dates. But to demonstrate one of the values of demographics, Eric guided us through a specific study to determine how burns will affect population size and viability. Losses are inevitable even when the burns are conducted with care. Demographics can help model this.

One of the good things that mark/recapture allow for is the collection of a lot of data while the snake is in hand. The snakes are tubed, measured, probed, sperm is collected (Eric, “I’ll let you think about how that might happen.”) and blood is taken (“It’s like an alien abduction.”). Handling response or trap shyness caused by handling is taken into account and temporal/methodological factors are considered such as temperature, time of year and the effort required to get the samples (person-hours, number of traps.) Using certain formulas, one can determine the best number of parameters to retrieve from the variables that are collected. Without Eric’s expertise and colored graphs I am not going to attempt to educate you on the many models and formulas we were walked through, but Eric explained how to estimate survival rates and reproductive frequencies to arrive at probabilities of population survival under different burn scenarios.

Next Eric delved into how important it is to know the rate of reproduction. In the herpetological literature most authors use a proportional method that divides the number of gravid females by the number of total females encountered. Eric argued that method is unreliable because gravid females bask much more than non-gravid females and therefore are much easier to detect. He prefers a model that determines the probability of a female being pregnant in a particular year. The proportion method yielded a reproduction frequency of 62% in his study population, but using the model built on mark/recapture data the reproduction frequency is 44%. Methods matter. As Eric stated in his

summary, “All models are wrong but some are useful.”

Eric then took us on a tour of his geographic variation studies, emphasizing that studying the variation in life history traits of massasaugas can give insight into processes that give rise to geographic patterns and how those traits might be linked to demographic characteristics, all of which can be used to improve models of population viability and extinction risks. Using data from dozens of studies he plotted graphs that demonstrated adult female SVL and neonate mass increased with increased precipitation, litter size decreased with increasing mean temperature, and size-fecundity relationship (same size females have larger litters at higher latitudes) and age-zero growth (they grow more slowly in the north, but they get bigger) both increased with increasing latitude.

We then got a brief glimpse into his studies of *Ophidiomyces* in snakes, more commonly referred to as snake fungal disease or SFD. Eric had more questions than answers about that disease and its effects on snake populations, but he did show how the reliability of fungal spore detection might be determined by mark/recapture models.

I’m getting tired of reminding you readers that I can’t possibly convey these presentations in this format with anything like an accurate or engaging picture. In spite of numerous graphs, some math, and complicated subject matter, Dr. Hileman kept us entertained, informed and educated throughout his talk. I really enjoy it when one of our presenters can give me an “ah-hah!” moment. Eric conveyed many. Then we went out to eat and drink and have some fun just chatting while he helpfully cleared up some other points for me and others at the table. I really liked him and think I could survive a few weeks in the rain forest under his tutelage even if I couldn’t sip banana daiquiris. Sadly, this year he’s not offering the course.

Herpetology 2017

In this column the editorial staff presents short abstracts of herpetological articles we have found of interest. This is not an attempt to summarize all of the research papers being published; it is an attempt to increase the reader's awareness of what herpetologists have been doing and publishing. The editor assumes full responsibility for any errors or misleading statements.

SUCCESSFUL RELOCATION OF A GECKO SPECIES

T. P. Bell and S. M. Herbert [2017, Journal of Herpetology 51(1):37-46] note that Duvaucel's geckos (*Hoplodactylus duvaucelii*) are large-bodied, long-lived, slow-breeding geckos endemic to New Zealand. Translocation is considered an important tool for conservation of this species. The first translocation of these geckos occurred in 1998 when 40 geckos were released on a pest-free island. Despite multiple survey efforts within the decade after release, captures were too sparse to determine if the population had successfully established. The authors revisited the population to investigate establishment over a longer time period (11–15 yr post release). They utilized a recently developed outcome assessment framework that assesses translocation's success as a progression through four, time-bound "Stages." Twelve founder animals were recaptured and all were larger than at release (Stage 1). Recruitment was evident (Stage 2) with 91.7% of all geckos captured during 2009–2013 being island-born. Mark-recapture results from 144 individuals estimated that 245 geckos (95% confidence interval: 179–336) were present in the population by February 2013, an approximately 6-fold increase in number since 1998 (Stage 3). Population viability analysis indicated the population has become self-sustaining, with an average population increase rate of 6.35–10.14% per year and a negligible probability of extinction within 50 yr (Stage 4). In this case, a 10–15 yr time period appeared to be a sufficient time frame for identification of translocation success by both traditional and time-bound criteria. Fulfillment of each time-bound indicator of short-term success therefore appears to have been a reliable predictor of ultimate translocation success in this long-lived, slow-breeding lizard species.

SHALLOW TIDAL HABITATS AS REFUGIA

V. Udyawer [2016, Journal of Herpetology 50(4):527-533] note that sea snakes are an important component of bycatch in commercial and small-scale trawl fisheries in tropical waters and are highly vulnerable to fishing-related mortality. Extensive boat-based surveys were conducted to investigate the assemblage and abundance of sea snakes within a protected shallow coastal bay adjacent to productive trawl fishing grounds. Spine-bellied sea snakes, *Hydrophis curtus*, and elegant sea snakes, *Hydrophis elegans*, were the most commonly encountered species. Based on the age structure of these two species, the bay was used primarily by juveniles. Temporal trends in age structure and sex ratios showed that *H. curtus* may use Cleveland Bay as a nursery ground, with gravid females entering the bay in summer months to give birth. In contrast, *H. elegans* appears to use the bay more consistently through the year, with ~30% of individuals being adults. This study also showed that shallow tidal habitats, too shallow for trawl fishing, are regularly used by sea snakes and may provide refugia for vulnerable life stages. The identification and protection of such habitats may further mitigate risks to sea snake populations from trawl fishing.

AGGRESSION IN JUVENILE GOPHER TORTOISES

T. A. Radzio et al. [2016, Chelonian Conservation and Biology 15(2):231-237] note that adult North American tortoises (*Gopherus* spp.) engage in aggressive interactions with conspecifics when competing for mates and burrows. However, aggressive interactions have not been widely reported in hatchling and juvenile tortoises. This paper describes aggressive interactions between wild hatchling and juvenile gopher tortoises (*Gopherus polyphemus*) based on video recordings collected at tortoise burrows. Immature tortoises usually inhabited burrows alone but occasionally shared them. Presence of multiple individuals inside burrows hindered tortoise movements in burrows. Hatchlings or juveniles exhibited overt aggression toward similar aged/sized conspecifics in at least 6 of 13 (46%) encounters, and cameras may have failed to detect aggression occurring inside burrows. Hatchlings and juveniles also exhibited aggressive responses to foreign objects that were similar in appearance to small tortoises. Aggressive behaviors resembled those of adults and included repeated ramming, pushing, biting, and flipping. Young tortoises may respond aggressively to conspecifics at burrows because the presence of additional individuals constrains thermoregulatory and antipredator movements within these important microhabitats. Social interactions appear to play a greater role in the ecology of hatchling and juvenile gopher tortoises than previously recognized.

EFFECTS OF FIRE ON HABITAT USE BY RACERS

C. A. F. Howey et al. [2016, Copeia 104(4):853-863] note that the effects of disturbance, including prescribed fire, vary among species and their ability to adjust to the altered environment. The authors' objective was to link fire-caused habitat changes with shifts in habitat use and behavioral changes in the southern black racer (*Coluber constrictor priapus*). They compared habitat availability between burned (experimental) and unburned (control) plots and used radio-telemetry to evaluate snake behavior and habitat use. The numerical abundance of *C. constrictor* in burned habitat was nearly twice that in the control. In both treatments, *C. constrictor* was associated with areas that were more open, had less canopy cover, more new vegetative growth, and less, shallower leaf litter. However, the availability of these habitats was greater in the burn treatment. Snakes were more surface active in the burn treatment and tended to be more arboreal in the control treatment. Differences in available habitat may have caused an increase in surface activity in the burn treatment, which could have biased detection rates and created higher apparent abundance in the burned treatment. Females moved more often in the control treatment, which may be due to a lack of preferred thermal habitat and reproductive thermoregulatory demands. Ultimately, fire changed habitat availability and altered the movement rates and behavior of *C. constrictor* causing ecological effects that may not be detected when researchers only compare abundance.

ALLIGATOR SNAPPING TURTLE CONSERVATION

B. Folt et al. [2016, *Herpetological Monographs* 30:21-33] note that the conservation of large, long-lived turtle species can be challenging because their life-history strategies make populations sensitive to changes in adult survivorship and populations may be difficult to sample. The alligator snapping turtle (*Macrochelys temminckii*) is a large freshwater turtle species occurring in North America for which commercial harvest has severely reduced populations throughout the species' range. Given recent population declines and a general deficit of demographic knowledge for *Macrochelys*, the authors conducted a mark-recapture study of *M. temminckii* during 1997–2013 in Spring Creek, Georgia, USA. They made 166 captures of 75 individuals using baited hoop-net traps and skin-diving searches. The observed and estimated population structure described the adult sex ratio as even and adults as more abundant than juveniles. Apparent survival was higher for adult males (0.98) and females (0.95) than for juveniles (0.86), and estimated population density was 13–14 turtles/stream kilometer. The survival estimates for adult *M. temminckii* are among the highest of all freshwater turtle species reported in the literature. The empirical demographic parameters described here and a literature review were used to build an updated population model for *M. temminckii*; the model estimated a finite rate of population increase consistent with a growing population ($\lambda = 1.036$) at Spring Creek, and population viability analysis found the population growing over the next 50 yr in 100% of simulations. Application of this model to published survival estimates from two impacted western populations indicated a declining population ($\lambda = 0.563$) with a high risk of extirpation in Oklahoma and a population with a slow rate of decline ($\lambda = 0.978$) but approaching stability in Arkansas. Simulations identified combinations of survival values that generate viable populations and also characterized population structure resulting from viable scenarios. This is the first study to document a stable and viable population of *Macrochelys*. The authors suggest that the population parameters described at Spring Creek are the best approximation of reference demographic conditions for *Macrochelys* to date, and this study provides a general framework applicable for large, long-lived, endangered turtle species for which demographic data are unavailable.

DIET AND BEHAVIOR OF TIMBER RATTLESNAKES

S. M. Goetz et al. [2016, *Journal of Herpetology* 50(4): 520-526], during a 17-yr telemetry study, examined the diet and ambush behavior of a population of *Crotalus horridus* in southeastern Virginia. Forty dietary items were identified from 37 fecal samples. The study documented 722 instances of snakes in an ambush posture, 61% of which were in a vertical-tree posture, as if hunting arboreal prey at the base of a tree. The most common prey items were eastern gray squirrels (*Sciurus carolinensis*), which accounted for 45% of all dietary items and represented an estimated 78% of total biomass consumed by *C. horridus*. Prey was not consumed in proportion to availability, based on small mammal surveys. The analysis provides indirect evidence that the vertical-tree foraging behavior is adopted to target arboreal eastern gray squirrels. Further, it provides support for the hypothesis that *C. horridus* alters ambush behavior to forage selectively for specific prey types.

SURVIVAL OF REINTRODUCED CHIRICAHUA LEOPARD FROGS

P. E. Howell et al. [2016, *Copeia* 104(4):824-830] note that global amphibian declines have been attributed to a number of factors including disease, invasive species, habitat degradation, and climate change. Reintroduction is one management action that is commonly used with the goal of recovering imperiled species. The success of reintroductions varies widely, and evaluating their efficacy requires estimates of population viability metrics, such as underlying vital rates and trends in abundance. Although rarely quantified, assessing vital rates for recovering populations provides a more mechanistic understanding of population growth than numerical trends in population occupancy or abundance. The authors used three years of capture-mark-recapture data from three breeding ponds and a Cormack-Jolly-Seber model to estimate annual apparent survival for reintroduced populations of the federally threatened Chiricahua leopard frog (*Lithobates chiricahuensis*) at the Buenos Aires National Wildlife Refuge (BANWR), in the Altar Valley, Arizona, USA. To place the results in context, they also compiled published survival estimates for other ranids. Average apparent survival of Chiricahua leopard frogs at BANWR was 0.27 (95% CI [0.07, 0.74]) and average individual capture probability was 0.02 (95% CI [0, 0.05]). The apparent survival estimate for Chiricahua leopard frogs is lower than for most other ranids and is not consistent with recent research that showed metapopulation viability in the Altar Valley is high. The authors suggest that low apparent survival may be indicative of high emigration rates, and recommend that future research should estimate emigration rates so that actual, rather than apparent, survival can be quantified to improve population viability assessments of threatened species following reintroduction efforts.

DWARF GECKOS VERSUS INVASIVE FIRE ANTS

C. Kelehear et al. [2017, *Herpetologica* 73(1):48-54] note that invasive species present challenges to native organisms and offer unique opportunities to examine adaptations to novel stressors. They studied behavioral responses to invasive red imported fire ants (*Solenopsis invicta*) in native Puerto Rican dwarf geckos (*Sphaerodactylus macrolepis*) on Guana Island, British Virgin Islands. Geckos were exposed to no fire ants, few fire ants, or many fire ants. *Solenopsis invicta* was aggressive toward the geckos and the foraging ants frequently stung dwarf geckos, even when far from the mound. Dwarf geckos displayed an array of anti-ant behaviors including consuming fire ants, flicking ants away with their limbs and/or tail, and rapidly fleeing attacking ants. These behaviors were elicited more frequently when more fire ants were encountered. Despite being stung often and by as many as nine fire ants, none of the tiny geckos died. Future research could usefully explore potentially delayed effects of fire ant envenomation and the impacts of fire ants on these geckos via egg predation or competition for invertebrate prey.

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For sale or trade: Probable pair of albino Harquahala rosy boas. They were born in my home in late 2016 and are feeding on f/t peach fuzz mice. Pure locality animals exhibiting a recessive gene. Viewing is possible, parents on site. I can drive to meet a reasonable distance, or ship if you are not local. Discount if you pick them up from my home. Cash, credit card or PayPal. Call or text 510-318-1715, or email elenabmoss@gmail.com.

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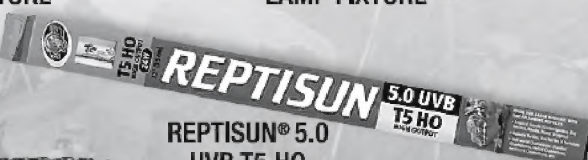
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Minutes of the CHS Board Meeting, March 17, 2017

President Rich Crowley called the meeting to order at 7:35 P.M. A quorum was not present. Board members Dan Bavrisha, John Bellah, Lisette Chapa Morgan Lantz, Mike Scott and Jessica Wadleigh were absent. The minutes of the February 10 board meeting were read and accepted.

Officers' Reports

Treasurer: Andy Malawy went over the February financial report.

Membership secretary: Mike Dloogatch read the list of expiring memberships. Current membership is approximately 440.

Sergeant-at-arms: Attendance at the February 22 general meeting was 25.

Committees

Shows: Dick Buchholz has been sending out monthly emails

listing all scheduled live animal shows.

Adoptions: Linda Malawy will check in Dropbox to see the form Lisette put together for members to list species they might be interested in adopting.

Jr. Herpers: Frank Sladek will be in charge of the Jr. Herpers' tables at 'Fest.

Nominating: Rich Crowley expressed a strong opinion that we need to start recruiting next year's officers and members-at-large now. He will get together with Mike Scott to form a nominating committee early.

ReptileFest: John Archer expressed an urgent need for exhibitors to register. He expects about 20 student volunteers (Niles West and Benito Juarez High Schools).

The meeting adjourned at 9:20 P.M.

Respectfully submitted by recording secretary Gail Oomens

News and Announcements

SHOW SCHEDULE

In addition to ReptileFest the Chicago Herpetological Society puts on many live animal displays throughout the year. The events now scheduled for April through July are listed below. CHS members who wish to participate in an event should call or text ahead to Show Coordinator Dick Buchholz, 805-296-9516, to confirm.

- Notebaert Nature Museum, first full weekend of each month, Saturday and Sunday, 10 A.M. – 3 P.M.
- All Animal Expo, first Saturday & third Sunday of each month, 10 A.M. – 3 P.M., Dupage County Fairgrounds, Wheaton.
- Chicago Pet Show, April 29–30, 10 A.M. – 5 P.M., Oak Lawn Community Pavilion, Oak Lawn.
- Cosley Zoo Endangered Species Day, May 29, 10 A.M. – 2 P.M., Cosley Zoo, 1356 N Gary Ave, Wheaton.
- Westmont Pet Promenade, May 21, 11 A.M. – 2 P.M., Ty Warner Park, 808 Blackhawk Dr, Westmont.
- Aurora GreenFest, June 10, 10 A.M. – 3 P.M., Prisco Community Center, 150 W Illinois, Aurora.
- Raging Waves Waterpark, June 17, 10 A.M. – 6 P.M., 4000 Bridge St, Yorkville.
- Rockin' for Reptiles, June 24, Midwest Museum of Natural History, Sycamore.
- Greek Festival, June 24–25, 3 P.M. – 9 P.M., St Nectarios Greek Orthodox Church, 133 S Roselle Rd, Palatine.
- Greek Festival, July 8–9, 3 P.M. – 9 P.M., St Andrews Greek Orthodox Church, 5649 N Sheridan Rd., Chicago.
- MSI Members Night, July 19, 5:30 P.M. – 9 P.M., Museum of Science and Industry, Chicago.
- Sheffield Garden Walk, July 22–23, Noon – 9 P.M., Sheffield & Webster, Chicago.
- Raging Waves Waterpark, July 29–30, 10 A.M. – 7 P.M., 4000 Bridge St, Yorkville.

NEW CHS MEMBERS THIS MONTH

Eric T. Hileman
Lisa Efstathiou
Michael Levins
Doris Agbefe
Perris family

Erik Williams & Zoe Magierek
Anthony Carmona
Ashleigh Fischer and Jon Walker
Matthew E. Johnson
Amy Zukoski

Tony Colbert
Rick Nevios
Alana Williams
Faith Leschman
Craig Ellebrecht

UPCOMING MEETINGS

The next meeting of the Chicago Herpetological Society will be held at 7:30 P.M., Wednesday, April 26, at the Peggy Notebaert Nature Museum, Cannon Drive and Fullerton Parkway, in Chicago. **Gerry Salmon** of Boerne, Texas, will speak about “Prey Selection in Copperheads (*Agkistrodon laticinctus*)—A Study Based on Western Texas Populations.”

At the May 31 meeting **Dr. David Steen**, an assistant professor at Auburn University, will speak about reptile conservation efforts in the southeastern United States.

The regular monthly meetings of the Chicago Herpetological Society take place at Chicago’s newest museum—the **Peggy Notebaert Nature Museum**. This beautiful building is at Fullerton Parkway and Cannon Drive, directly across Fullerton from the Lincoln Park Zoo. Meetings are held the last Wednesday of each month, from 7:30 P.M. through 9:30 P.M. Afterwards, some of us adjourn to a local restaurant for food, drink and conversation. All are welcome.

Board of Directors Meeting

Are you interested in how the decisions are made that determine how the Chicago Herpetological Society runs? And would you like to have input into those decisions? If so, mark your calendar for the next board meeting, to be held at 7:30 P.M., Friday, May 19, 2017, at the Schaumburg Township District Library, 130 S. Roselle Road, Schaumburg.

The Chicago Turtle Club

The monthly meetings of the Chicago Turtle Club are informal; questions, children and animals are welcome. Meetings normally take place at the North Park Village Nature Center, 5801 N. Pulaski, in Chicago. Parking is free. For more info visit the group’s Facebook page.

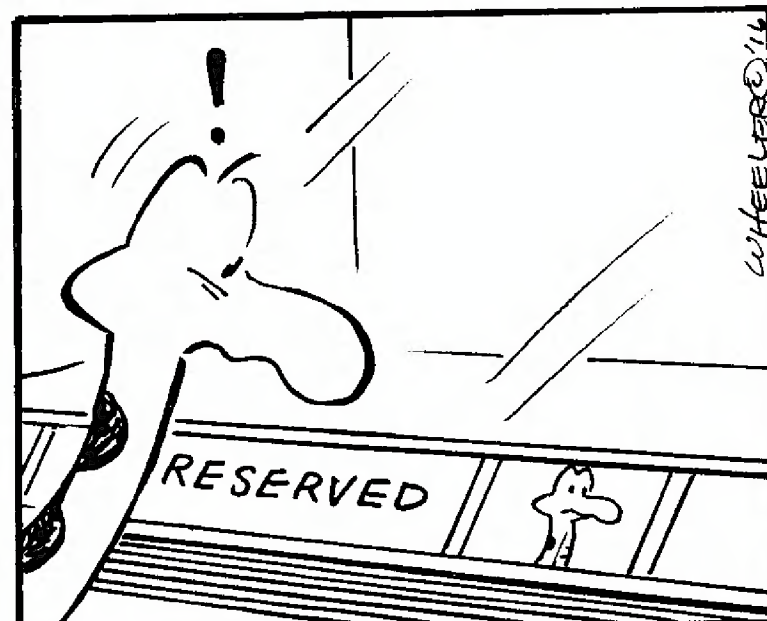
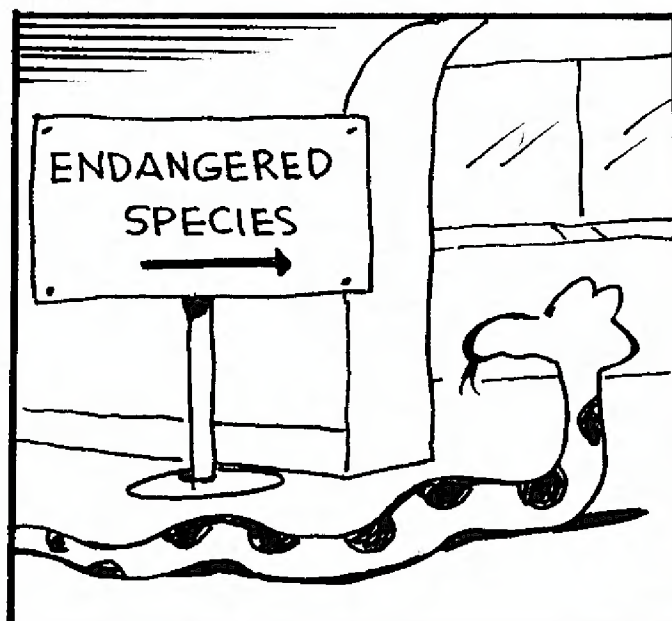
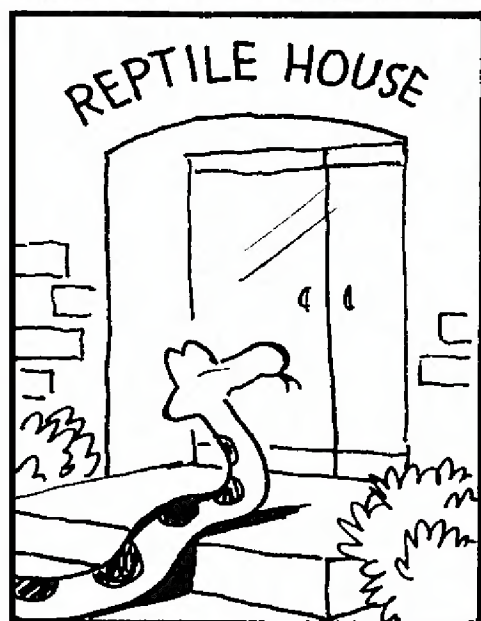
REPTILEFEST

ReptileFest 2017 is now history. It was full of surprises and satisfactions, fulfilled hopes and happy reunions. It had its standard share of challenges and disasters. You showed off your animals and yourselves. You worked really hard. You represented the Chicago Herpetological Society in the best way possible. Take a bow. Hear the applause. You deserve it.

CHS AWARDS PRESENTATION

Each year the Chicago Herpetological Society recognizes a few select members for their service to the organization. At the February 22 meeting awards were presented in two categories. **John Archer** received the CHS Merit Award. This honor is given each year to one or more individuals selected by the Awards Committee for outstanding service to the society. **Mike Dloogatch** received the Presidential Service Award, presented each year to a person selected by the president as having been particularly helpful to the president or to the CHS Board. Additionally, past CHS presidents **John Bellah**, **John Archer** and **Jason Hood** were presented with handsome wooden gavels to commemorate their terms in office.

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